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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,479	10/07/2003	Toshiyuki Kawasaki	R2184.0274/P274	6642

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EXAMINER	
BOUTSIKARIS, LEONIDAS	
ART UNIT	**PAPER NUMBER**
2872	

DATE MAILED: 02/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/679,479	KAWASAKI ET AL.	
	Examiner	Art Unit	
	Leo Boutsikaris	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *19-26,34 and 35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *19-26,34 and 35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 19, 22, 34, 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyake (US 5,428,472).

Regarding claim 19, Miyake discloses a diffraction optical element 7 divided into a plurality of grating regions, i.e., top half and lower half, each of the grating regions having a grating with a prescribed pitch, e.g., d_{13}, and d_{12}, respectively, that is different from pitches of the other grating regions (for example, $d_{12} < d_{13}$), and each of the grating regions having a different duty, i.e., M/L, where the duty denotes the ratio of the width of a protrusion of the grating region to the pitch of the grating region (Figs. 6a-6d, lines 42-58, col. 12). Furthermore, at least one of said plurality of grating regions, i.e., the lower half, has a variable pitch, i.e., $d_{11} < d_{12}$. It is noted that the grating of Fig. 6(a) of Miyake is identical to the grating 34 of Fig. 19A of the specification, if one rotates the latter by ninety degrees.

Regarding claim 22, the diffraction efficiencies of the grating regions are equal to each other (lines 46-47, col. 12).

Regarding claims 34, 35, the grating 7 can be used in conjunction with an optical pick-up system comprising:

a light source 21;

a condensing lens 24 for guiding the light emitted from the light source onto an optical recording medium 25;

a diffraction optical element 22 positioned on an optical path extending between the light source 21 and the optical recording medium 25; and

a photodetector 26 for receiving a portion of the light beam reflected from the optical recording medium and diffracted from the diffraction grating, the diffraction grating being divided into a plurality of grating regions 22a, 22b, each region with a different pitch, and a duty of each region being set according to the respective grating pitch (see discussion regarding claim 19 and Fig. 23).

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 19 is rejected under 35 U.S.C. 102(e) as being anticipated by Kadowaki (US 6,898,169).

Kadowaki discloses a diffraction optical element 61 divided into a plurality of grating regions, i.e., top half and lower half, each of the grating regions having a grating with a prescribed pitch, i.e., Pt1, and Pt3, respectively, that is different from pitches of the other grating regions (for example, Pt1 < Pt3), and each of the grating regions having a different duty, where the duty denotes the ratio of the width of a protrusion of the grating region to the pitch of the

grating region (Figs. 2A-2B, lines 39-58, col. 7). Furthermore, at least one of said plurality of grating regions, i.e., the top half, has a variable pitch, i.e., Pt1 < Pt2.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 20, 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake (US 5,428,472) in view of Shiono (US 5,742,433).

Miyake discloses all the limitations of said claims, including the limitation that in the various grating regions of Fig. 6, the duty M/L decreases as the grating pitch decreases (see Figs. 6b-6d). However, Miyake does not explicitly teach that the grating regions are made from a birefringent material. Shiono discloses an optical diffraction grating 10, which can be used in conjunction with an optical disk, wherein the grating is formed by drawing an optically anisotropic and birefringent material, such as a polymeric film, for example, a synthetic resin, on a substrate, and creating grooves filled with isotropic material, such as air (lines 66-67, col. 5, lines 14-32, col. 8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an anisotropic birefringent material for making the gratings in Miyake's device, since synthetic resins, such as PMMA, are easy to pattern using electron beam lithography (see lines 14-19, col. 8 in Shiono).

Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kadowaki (US 6,898,169) in view of Shiono (US 5,742,433).

Kadowaki discloses all the limitations of said claim, including the limitation that in the various grating regions of Fig. 2A, the duty increases as the grating pitch decreases (for example, compare the ratio of the width of the lined region over the respective pitch for the grating regions characterized by Pt1 and Pt3 respectively). However, Kadowaki does not explicitly teach that the grating regions are made from a birefringent material. Shiono discloses an optical diffraction grating 10, which can be used in conjunction with an optical disk, wherein the grating is formed by drawing an optically anisotropic and birefringent material, such as a polymeric film, for example, a synthetic resin, on a substrate, and creating grooves filled with isotropic material, such as air (lines 66-67, col. 5, lines 14-32, col. 8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an anisotropic birefringent material for making the gratings in Kadowaki's device, since synthetic resins, such as PMMA, are easy to pattern using electron beam lithography (see lines 14-19, col. 8 in Shiono).

Claims 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyake (US 5,428,472) in view of Iwatsuka (US 5,245,471).

Regarding claim 25, Miyake discloses all the limitations of said claim except for specifying that the grating regions are formed from an isotropic material and the grooves, i.e., the regions between the grating regions are filled with an anisotropic birefringent material. Iwatsuka discloses an optical diffraction grating, which can be used in conjunction *inter alia* with optical disk systems, wherein the grating comprises regions of optically isotropic material 11, and

grooves 10 comprising anisotropic birefringent material positioned between regions 11 (Fig. 1, lines 50-61, col. 4, lines 38-44, col. 8). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the diffraction gratings of Miyake by creating regions of optically anisotropic material between regions of optically isotropic material, as taught by Iwatsuka, since the above structure is suitable for mass production (see lines 13-15, col. 11 in Iwatsuka).

Regarding claim 26, Iwatsuka does not explicitly specify that the anisotropic material in the alternating region structure of Fig. 1 is liquid crystal. It would have been obvious to one of ordinary skill in the art at the time the invention was made to alternate a liquid crystal material with regions of isotropic material, in order to form the diffraction grating structure of Fig. 1 of Iwatsuka, since Official Notice is taken that diffraction gratings comprising liquid crystal material are widely used in the areas of liquid display systems, switchable holographic elements, etc., due to the controllability of the birefringence properties of said materials.

Response to Arguments

Applicant's arguments filed on 12/1/05 have been fully considered but they are not persuasive.

The gratings in both Miyake and Kadowaki can be thought as having at least two regions where the pitch is variable, as described above.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Leo Boutsikaris whose telephone number is 571-272-2308.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LEONIDAS BOUTSIKARIS
PRIMARY EXAMINER

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February 14, 2006